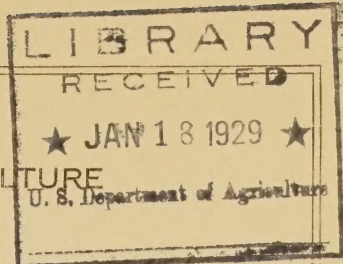


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UNITED STATES DEPARTMENT OF AGRICULTURE

OFFICE OF COOPERATIVE EXTENSION WORK

AND

BUREAU OF PLANT INDUSTRY COOPERATING

VOLUME 6

December 1928

NUMBER 7

# The Extension Pathologist

“TO PROMOTE ECONOMIC CROP PRODUCTION,  
IMPROVE THE QUALITY OF PLANT PRODUCTS, AND  
REDUCE WASTAGE IN STORAGE, TRANSIT, AND AT THE MARKET”

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THE EXTENSION PATHOLOGIST

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THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

RESEARCH REPORT

NO. 100

BY

JOHN D. COLEMAN

AND

ROBERT H. DICK

CHICAGO, ILLINOIS

1961

1962



DECEMBER FOLLOWS JUNE

Five months, July, August, September, October and November, have passed without an EXTENSION PATHOLOGIST having been issued. More or less continuous field work during this period made it necessary to reduce the desk work in Washington to a minimum. Summer is a busy time for the extension pathologists. This was particularly true this season, for in most sections of the United States conditions were unusually favorable for plant diseases. Reports of work done in states this season which will appear in future numbers should be of unusual interest. F.C.M.



## USES OF MARKET INSPECTION DATA BY PLANT PATHOLOGISTS

By R. J. Haskell, \*

Associate Pathologist in Charge, Plant Disease  
Survey, Bureau of Plant Industry, United States  
Department of Agriculture.

The fruit and Vegetable Inspection Service and the Plant Disease Survey as it exists today were both organized during the same year, 1917. From the very outset the Survey recognized the value of the information obtained by market inspectors on decays and other types of plant diseases as an important source of disease survey data, and steps were taken to obtain abstracts from the market inspection certificates. Various tables showing amounts of decay in car lots of fruits and vegetables were prepared and many of them were published in the Plant Disease Reporter commencing with some of its first supplements. As the work progressed, it became apparent that in order to make the most of these data more details and more copies of abstracts were needed. Accordingly in the latter part of 1922 the size of the data sheet was increased to 5" x 8" and more detailed abstracts with three copies of each were prepared. One set of copies was filed in the Bureau of Agricultural Economics, one in the Bureau of Plant Industry, where it was available to the various offices concerned, and the third was divided by states and mailed to the state collaborators. This method has now been followed for about five years.

In reviewing the work of the Survey in September of this year it seemed desirable to make inquiry as to the value of this work to Survey Collaborators. A questionnaire was therefore prepared in which the following questions were asked:

1. Do you use the abstracts, and if so, how?
2. What disposal do you make of them? Are they filed, stacked up, or thrown away?
3. Can you give specific instances where the abstracts have been of benefit to your work?
4. Under the circumstances do you advise a continuance of this service?

This questionnaire was sent out on September 16 to forty-nine collaborators, one in each state except Illinois where two collaborators were questioned.

Out of the forty-nine questionnaires sent, thirty-six replies had been received by December 1. With regard to the first question,

\* Paper presented at the annual meeting of the American Phytopathological Society, Nashville, Tennessee, December 28, 1927.







thirty collaborators said that they used the abstracts, while six said that they did not. Twenty-eight of them file the reports, two pass them on to other interested persons, four throw them away, and two do not make any statement with regard to disposal.

Concerning the continuance of the service as given in replies to question four, thirteen advise continuance and the remainder do not in view of the expense involved. At this point it should be stated that in the letter accompanying questionnaire it was said that the cost of preparing the abstracts amounted to a salary expenditure of perhaps \$3,500 in that it required the full time of two clerks and part time of two others. This of course is an estimate of the expense of the entire abstracting work, the results of which are used in the Bureau of Agricultural Economics and in the Bureau of Plant Industry as well as by collaborators. Some of the collaborators, however, apparently understood this as being the cost of the service that was given them. This may partially account for the large number of replies advising discontinuance in view of the expense.

The thirteen states which advised continuance were: Massachusetts, North Carolina, Florida, Mississippi, Louisiana, Texas, Oklahoma, Arkansas, Illinois, Indiana, North Dakota, Arizona, and Washington. It will be noted that most of these are in the South from which many shipments of vegetables are made long distances, or are states from which considerable special produce, such as potatoes or apples, is shipped.

The uses that collaborators make of these abstracts may be classified under the headings General, Teaching, Research and Extension.

Practically all of the collaborators, even those who replied that they did not use the reports, undoubtedly use them in a general way,-- that is, they look over them as they come in and they notice any outstanding amount of decay and make mental comparisons of the prevalence of diseases on the market with that in the field. Several of them said that in this way they obtain information that cannot be gained in any other way. Collaborators in four states specifically mention that they make use of the data for plant disease survey purposes, that is in getting information on prevalence and by learning of the occurrence of new or rare diseases. The collaborator from Colorado stated that through these reports he learned of the occurrence of certain diseases in the state that he did not know existed there before. From Washington, several reports of the occurrence of anthracnose of apple were received from parts of the state where anthracnose was not known to occur. In view of recent work it appears now that perennial canker might have been the disease concerned as its appearance on the apple fruit is very much like the anthracnose.





The abstracts are used in connection with the teaching of courses in plant pathology in the states of Massachusetts, Tennessee, Louisiana, Colorado, and Idaho. The data are used to show the student what the important decays are and to impress upon him the economic importance of plant diseases in general.

Collaborators in several states make mention of the fact that the data are used in research work. In Maine, data with regard to potato decays were studied and the types of decays in transit were compared with those in storage houses. In North Carolina, Doctor Poole working on sweet potato storage rots found the certificates valuable in learning of the kinds and amounts of rots in North Carolina sweet potatoes during transit. In Georgia, data were made use of in connection with a bulletin on watermelon diseases. In Louisiana, a graduate student working on strawberry decays carefully went through all of the abstracts of strawberry shipments and used the data in his thesis. In Indiana, they are using the reports on onion shipments to effect improvements in production, harvesting and storage methods and will be able eventually to reduce losses thereby. In Illinois, the information on peach decays was used in an article on "Rhizopus Rot of Peaches". In Arizona, J. G. Brown worked on bacterial rots of lettuce obtained information concerning the importance of these decays and found that losses in transit were correlated with those in the field. In Washington, a study of apple storage decays is an important project and one that is liable to be continued for several years. The abstracts are of much value in connection with this work and only recently have been put to good use in connection with the arsenic-residue, washing problem that has arisen of late.

Probably the most important way in which these abstracts are put to use by collaborators is in carrying the information concerning decay back to the producers. We have definite information that this has been done by Maine, in the case of potato rots; West Virginia, with apple diseases (and they have been able to show the growers that sprayed apples carry better than unsprayed ones); Florida, Mississippi, and Texas, with regard to diseases of vegetables; citrus, in the case of Florida; Indiana, with onion diseases; Missouri, with strawberry rots; Wisconsin and North Dakota, with potato rots; Arizona with lettuce; and Washington with apples. In North Carolina, the condition of a storage house was checked with the heavy loss of sweet potatoes at destination. It was found in this case that the storage house was heavily contaminated with a number of disease-producing fungi and steps were taken to remedy this condition in order that sweet potatoes be not infected in the future. In Missouri it was noticed that the losses from strawberry decays of various kinds were running high in shipments from the southern and southwestern parts of the state. The information was tabulated and put in the hands of Extension workers for carrying back to producers. Several collaborators stated that the abstracts had been used as a basis for extension talks and in New York it was stated that although the abstracts are not being used at the present time, they were





formerly made use of in connection with extension schools held in important producing sections of the state. For instance when an extension school was to be held in a fruit growing section the abstracts concerning fruits from that section were sorted out and taken to the school where they were studied by the growers themselves.

It would seem therefore, that when these reports are considered as a whole they are put to considerable use from the general, teaching, research and extension standpoints.

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#### SURVEY DATA ON THE INCREASE AND CONTROL OF STINKING SMUT IN ILLINOIS

By L. R. Tehon  
Illinois State Natural History Survey\*

It is only thirty-six years since Dr. G. P. Clinton made the first collection of stinking smut in Illinois; yet in the last six years alone this disease has cost the wheat growers of the State nearly a million dollars in "dockage" at the market, while in one year--1927--the loss in yield would have been valued at more than \$1,500,000.

From 1892 to 1920, stinking smut was regarded as among the least important of wheat diseases in Illinois. Although it was, at times, destructive and costly in scattered localities, it was always readily controlled by using the formaldehyde treatment and never became a state-wide problem.

In 1922, however, our Survey gathered data which showed that the disease had become prevalent and destructive in 17 of the 102 counties in our State. The average field prevalence, in terms of smutty wheat heads, was 1.2 per cent; and 0.371 per cent of the yield of the State suffered an average "dockage" of 6.9 cents per bushel--a cash loss of \$14,190.00 in the sale of the crop.

\* A plant disease survey, under the writer's direction, is maintained in Illinois by the State Natural History Survey. One of its tasks is to record annually the variations in prevalence and destructiveness of crop diseases and to use that information to guide farmers in disease control.





The recent reports by Doctor Gaines of the presence of new and virulently pathogenic smut strains suggest that this sudden increase of smut may have been due to the spread and increase of these. This supposition finds some support in the results of two surveys made by agents of the Office of Cereal Investigations in 1918 and 1919. In the first year, they found stinking smut prevalent to the extent of 1.8 per cent in 51 fields, while in the second year their records give a prevalence of 0.3 per cent in 92 fields. The first of these surveys was made in a narrow belt running east and west across the central part of Illinois, in the region where the Crimean wheats were securing their foothold in common culture.

Since 1922 we have been permitted, through our collaborative relations with the Federal Plant Disease Survey, to add to our field data a considerable quantity of market data, which we obtained by sending questionnaires to the grain dealers of the State. As a result, we have been able to note the increase in prevalence and destructiveness of the smut, year by year, and finally to show the effect of a single season's concerted application of the copper carbonate treatment.

A summary of the data we have collected gives the following table, in which the three final columns will be found especially significant.

Year	Counties		Field prevalence:		Market Data		
	yielding		(Av. Per cent of:		Per cent of:		
	data		heads smutted)		mktd. grain:		
	:(102 in Ill.):		:		with smut. : (cents: Loss		
						Rate : Dockage	
						:per bu.):	
1922 :	17	:	1.20	:	.371	: 6.9	: \$14,190
1923 :	55	:	2.50	:	.317	: 3.7	: 7,331
1924 :	34	:	4.03	:	1.043	: 4.6	: 17,777
1925 :	7	:	1.43	:	(no data secured)		
1926 :	44	:	.45	:	7.749	: 7.4	: 191,300
1927 :	68	:	3.98	:	25.550	: 8.3	: 518,572

In the five years beginning with 1923, as the market data show, the proportion of smutty grain became eighty times as great; the average dockage rate per bushel more than doubled; and the total cash loss from



dockage increased to seventy times the original amount.

During these years, the trend of the smut was recognized by our Survey; and each season the farmers of the State were urged to take measures for their protection. Newspaper articles, circular letters to farm bureaus, and similar devices familiar to every extension pathologist were used to tell the story of the smut's increase and to forewarn the wheat grower of the danger threatening his crop.

But it required the tremendously destructive and costly epidemic of 1927 to bring forth a full realization of the importance of the disease. A million and a half dollars worth of grain made worthless by the smut in the field might have been accepted as one more of the inescapable accidents incidental to production; but that one farmer in every four should receive eight and a half cents less per bushel for his product was a matter calling for an immediate remedy. The demand for smut-control directions was felt everywhere. Hastily prepared mimeographs were distributed at once; large numbers of the U. S. Department's Circular No. 108 were distributed by our Survey, the Extension Service, and the county farm bureaus; full advantage was taken of the newspapers' willingness to accept printable material on a live topic; radio stations broadcast directions day after day; and displays and demonstrations were in evidence at the State and county fairs.

For the first time in the history of the State, the treatment of seed wheat became general; and we estimate that fully seventy-five per cent of the wheat planted in the fall of 1927 was treated with copper carbonate.

It was with particular interest, therefore, that we undertook our annual market survey, following the 1928 harvest. For this purpose, we mailed 1,000 questionnaires to the grain dealers of the State. From the responses we have received we are able to present the following data, for comparison with those given in the foregoing table.

1. Counties furnishing data. . . . .	.47
2. Field prevalence (from field examinations before harvest.) . . . . .	0.47%
3. Smutty wheat in the marketed crop . . . . .	0.343%
4. Average dockage per bushel . . . . .	3.3¢
5. Total dockage loss for the State . . . . .	\$2,608.27

The effect of a single season's general treatment of wheat seed may be stated briefly to be: A reduction in field prevalence to one-tenth of the previous amount; a reduction in the proportion of smutty grain in that offered for sale to practically one-seventy-fifth of the





previous amount; a 55 per cent reduction in the average dockage per bushel; and an apparent cash saving to the wheat growers of \$515,000. In fact, the control resulting from one general application of copper carbonate throughout the State was equal to the ability of the smut fungusto spread and increase through five consecutive years.

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#### NEW FUNGICIDES FOR CEREALS.

In view of the marked increase in damage caused by oats smut which has occurred during the last two years, the results obtained in Illinois with Ceresan and in Ohio with Smutttox are of particular interest. F.C.M.

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#### A NEW SEED TREATMENT FOR OATS.

From a press notice prepared by Dr. Benjamin Koehler,  
Assistant Chief, Crop Pathology, Agricultural  
Experiment Station, Urbana, Illinois.

A dust seed treatment has now been found for oats which promises to be considerably superior to the formaldehyde treatment which has been standard for the last thirty years. Chemical dust treatments are more convenient and "foolproof" than liquid treatments for the treatment of seed of farm crops against diseases. Successful dust treatments are now available for the treatment of wheat and corn, but these same treatments had failed as a remedy for oat smut. Therefore, experiments have been made by the writer during the past four years, to find a satisfactory dust treatment against oat smut.

Dusts giving good control of smut equal to that by formaldehyde were soon found, but the ingredients were relatively expensive. During the past two seasons, however, an alcohol-mercury compound was used which gave better results than any treatment used heretofore. In one experiment comprising ten replications with 60-day oats, the yield was increased an average of 14.2 bushels per acre. In another experiment involving ten replications of Big-4 oats, there was an





average increase of 19.1 bushels per acre. The increases were nearly twice as great as with the standard formaldehyde treatment. This new compound gave perfect smut control but this alone would hardly account for all of the increase in yield. Apparently it also controlled some of the other diseases which beset the oat plant such as the seedling diseases caused by infection from the soil. The compound is being manufactured by one of the commercial organizations under the trade name of Ceresan. Three ounces of the dust were used per bushel. As in the case of all dust treatments, thorough mixing of the dust with the grain in a good homemade barrel type mixer or a commercial mixer is necessary.

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# RESULTS OF OAT SMUTS DEMONSTRATIONS

By Dr. A. L. Pierstorff, Extension Plant Pathologist,  
Columbus, Ohio.

As far back as 1921 the Department of Botany and Pathology at the Ohio Agricultural Experiment Station experimented with the use of various dusts for the control of oat smuts. It is estimated that the loss, due to oat smuts over a six year period from 1918 to 1923, was over 3,500,000 bushels in Ohio alone.

Because the liquid treatments would sometimes give injury to the grain safer methods for treating seed for smut were sought. About every conceivable fungicide known was used and finally after many trials, J. D. Sayre, R. C. Thomas, Paul Tilford and others developed the new formaldehyde dust which has given the following results. These results do not include experimental work done by the Ohio Station, but are demonstrations conducted by farmers through the aid of the county agricultural agents. This new formaldehyde dust is manufactured and sold under the trade name of "Smuttox". Following are the results of the oat smuts demonstrations for 1928:

County	Check	Smuttox treated	Formaldehyde treated
Ashtabula	left no check	0.7	---
"	6.3	0.4	2.0
Auglaize	6.0	0.0	1.2
"	5.4	trace	9.6
"	1.4	trace	trace
"	trace	6.0	0.0
Carroll	14.6	0.0	trace
Clark	5.0	0.3	---
Columbiana	severe last year	1.0	1.0
Coshocton	0.0	0.0	0.0
Crawford	6.0	0.0	---
"	6.1	0.0	---
"	3.0	0.0	---
"	6.6	0.0	2.4
Cuyahoga	8.5	0.1	0.1
Mercer	13.0	trace	---
"	15.0	0.0	---
Wayne	18.0	0.0	---
"	26.5	0.0	---
"	20.0	0.0	---
"	0.0	trace	---
Wood	7.4	0.5	2.9





It is to be noticed that the results of Smuttox are almost too good to be true. One report reached the specialist in which control was not secured. This man had treated his oats in an open box and had not covered the grain. It is not surprising that control was not secured. In the majority of these demonstrations the material was given to the farmer and he did his own treating.

From an extension standpoint, this was desirable, because we would soon see how foolproof the method and materials were. You know some people just won't follow directions. Some men treated the oats in closed containers as used for treating wheat. Others, placing the grain on the floor, sprinkled three ounces of Smuttox per bushel over it, shoveled the grain through once and sacked it up. Some of the grain in these demonstrations remained in the sacks for over a month after treating and no injury to the stand was noticeable. Other grain was sown the next day. Equally good results were obtained by sowing the grain the following day after treating or by permitting it to stand sacked up for a period of one month or longer.

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## POTATO DISEASES STUDIED BY HIGH SCHOOL STUDENTS

The following report sent in by Dr. N. J. Giddings of West Virginia is suggestive of what may be accomplished by cooperative work with schools. F.C.M.

### POTATO SPRAYING TEST

By Harry Davis, Student of Vocational Agriculture,  
Valley District High School,  
Masontown, W. Va.

My potato enterprise was conducted in cooperation with the Agricultural Experiment Station of West Virginia University to show the value of spraying potatoes. For the land to grow the potatoes I selected one acre of clover sod and plowed it on March 21, 1927. One week before planting I harrowed the land three times, disked it once and drilled 950 lbs. of acid phosphate on the seed bed. At planting time I added 1,000 lbs. of a mixture made by mixing equal parts of potash and sulphate of ammonia.

I began to spray the potatoes when the plants were about three inches high to control the flea beetle. Arsenate of lead was used for this spray. After seven days I began the regular spray schedule and continued spraying at seven-day intervals through the summer, making a total of nine sprays. Five rows in the field were not sprayed, four rows were sprayed with arsenate of lead and the remaining twenty-four rows were sprayed with arsenate of lead and Bordeaux mixture. The plants were cultivated regularly and despite the heavy rains were kept free from weeds. The rows sprayed with Bordeaux and arsenate of lead remained green and thrifty about four weeks after the unsprayed rows had completely died down. The rows sprayed with arsenate of lead remained green about one week longer than did the unsprayed rows. The tubers from the unsprayed rows were small and of poor quality. The tubers from the rows sprayed with arsenate of lead were only slightly larger. The tubers from the rows completely sprayed were large, uniform and healthy.

The yields for the various rows were as follows: The rows sprayed with arsenate of lead and Bordeaux mixture produced 396 bushels per acre, the rows sprayed with arsenate alone produced 264 bushels per acre and the unsprayed rows produced 231 bushels per acre.

My total cost of producing the acre was \$119.50. The total yield for the acre including the five unsprayed rows and the four rows sprayed only with arsenate of lead was 350 bushels and the cost of production was \$.341 per bushel.





CONFERENCE ON EXTENSION WORK DECEMBER 28, 1928.

The conference on extension work which has become an annual feature of the winter program of the American Phytopathological Society will be held at 2:00 p.m., December 28, Room 130, Macy Hall, Teachers College, Columbia University, New York, N. Y. The subject this year is "Disease-free seed and plant production and distribution in relation to extension work." Special attention will be given to discussion of problems related to beans, tomatoes, cabbage, sweet potatoes, and brambles. All those attending the New York meetings are invited to participate in this round table discussion.

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Articles, news notes, or suggestions with regard to subjects that might profitably be discussed in this news sheet, should be addressed to:

F. C. Meier,  
Extension Plant Pathologist,  
Bureau of Plant Industry,  
U. S. Department of Agriculture,  
Washington, D. C.



